

Experiment Proposal: AR_2012_No4

Title	Author/Spokesperson
Test with LWL fibres for beam loss detection	A. Reiter (1431)

Summary & Aim

- This test is part of the R&D for FAIR: Feasibility of beam loss detection with light-guides and PMTs based on Cerenkov light
- Requested beam time: 1 shift

Machine parameters

Machine	SIS18, fast/slow (???) extraction, h = 4
Mode	B-exp
Exp. area	HTP
Ion species	Uranium, Nitrogen
Beam energy	300 – 800 MeV/u
Spill length	1 μ s extraction; 4 bunches of \sim 100 ns length
Particle number	10^7 – 10^9 per spill (depending on Z and energy)
Repetition rate	\sim 0.1 Hz or higher
Shifts	1 shift
Beam Time Period	Any machine experiment (B-exp) after September 2012
Health & Safety	No concerns

Experiment procedure

After setup of beam at end of HTP line, the following series of data are taken:

Coincidence measurement between 2 PMTs on each end of fibre. Timing offset determines position of particle shower.

Experiment Setup		
Exp. area	HTP, in front of beam dump	
Description of setup	<ul style="list-style-type: none"> • 2 LWL fibres + 4 PMTs; Readout at each end of fibres • Fibre position along beam line HTP (dipole to beam dump) • Test together with additional scintillator as position reference 	
Duration of setup	<ul style="list-style-type: none"> • Mounted only during beam time 	
DAQ & Electronics Software	Long cable to Atomic Physics (AP) container, switchable attenuator and fixed-gain amplifier, FESA crate with I/O modules and CAEN 32-channel ADC, digital oscilloscope FESA class to be expanded to include I/O modules, etc..... Java GUI (to be developed)	
Trigger		
Experiment Preparation / Required support		
Estimated amount of time, manpower and equipment		
Estimates or simulations	1 month	Signal estimate A. Reiter (ideally Geant4 simulation)
Mech. Workshop		Not required
Beam Line Installation	2 days	A. Reiter
Electronics & DAQ	6 month	QDC and TDC required Development of FESA class (????) Setup & test of electronics in DAQ container and tests (A. Reiter)
Control System Integration		None
On-site tests		A. Reiter
Modification of exp. area	No	
Dismantling	4 h	Dismount setup, store detector at HTP (A. Reiter)
Remarks & Comments		
Use PMT type Hamamatsu R1635, can be obtained from KPH Mainz / University of Glasgow (D. Middleton, JRM Annand)		